KARPENKO, G.V.; LITVIN, A.K.; BABEY, Yu.I.

Changes in the microhardness of structural components in steel during its pickling in nitric acid solutions. Vliian.rab.sred. na svois.stali no.1:80-83 '61. (MIRA 15:5)
(Steel—Pickling) (Hardness)

28704

18 8310

S/021/61/000/003/009/013
D274/D301

AUTHORS: Kryp'yakevych, R.I., Babey, Yu.I. and Karpenko, G.V.

TITLE: On the role of hydrogen in corrosion fatigue-failure of steel

PERIODICAL: Akademiya nauk UkrSSR. Dopovidi, no. 3, 1961, 325-327

TEXT: An experimental study of corrosion fatigue is described. The experiments showed that the reduction in fatigue strength can be related exclusively to the cathode process and the absorption and diffusion of hydrogen involved. The specimens were made of steel 45 and had a diameter of 20 mm. The corrosive substance was a 3% NaCl-solution in water (similar to sea-water), which was introduced through tube 1, separator 2, and tube 3 of Fig. 1. The anode was platinum wire 4, the cathode - the specimen. The current density varied between 0.007 to 6.2 amp/dm^2. It is noted that conditions of flow of the electrolyte have a considerable effect on

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On the role of hydrogen...

the cathode process and on the hydrogenization. A figure shows the dependence of the conditional corrosion-endurance limit σ_{-1}^{N} on the current density D_c. The experiment led to the following conclusions: 1) The increase (within certain limits) of the current density with cathode polarization, leads to a decrease in the intensity of the anode process, as a result of which the endurance limit σ_{-1}^{N} increases. 2) With optimum current-density (under the given conditions, $D_c \approx 0.15$ amp/dm^2), the anode process ceases altogether; σ_{-1}^{N} reaches its maximum value, which is by 10% lower than the endurance limit in air σ_{-1}. This can be explained by the presence of the cathode process, and by adsorption and diffusion effect. 3) An increase in the current density above the optimum value, leads to an intensification of the cathode process and to a decrease in σ_{-1}^{N}. 4) Cathodic protection cannot, even with optimum choice of current density, completely reestablish the fatigue-limits of the metal. The character of the fatigue-curves in the cathode process shows that this process develops with time, leading

Card 2/4

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D274/D301

On the role of hydrogen...

to a further decrease in metal endurance. This has to be taken into account in calculating endurance of parts which are subject to sign-changing loading and to corrosion. There are 3 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Instytut mashynoznavstva ta avtomatyky AN USSR (Institute of the Science of Machines and Automation AS UkrSSR)

PRESENTED: by Academician Yu.K. Delimars'kyy AS UkrSSR

SUBMITTED: July 19, 1960

Card 3/4

MAKSIMOVICH, G.G.; YANCHISHIN, F.P.; KARPENKO, G.V.

Effect of liquid media on the fatigue resistance of cast iron.
Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.7:32-36 '61.
(MIRA 15:1)

(Cast iron--Fatigue)

BABEY, Yu.I.; KARPENKO, G.V.

Effect of high-speed and heavy-feed machining and technological inherence on the fatigue resistance of steel. Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.7:41-58 '61. (MIRA 15:1)
(Steel--Fatigue)

BABEY, Yu.I.; KARPENKO, G.V.; LITVIN, A.K.

Effect of cutting conditions on the surface hardening in machining steel 45 on lathes. Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.7: 59-64 '61. (MIRA 15:1)

(Steel) (Turning)

BABEY, Yu.I.; KARPENKO, G.V.

Effect of machining on the fatigue resistance of steel after its preliminary corrosion under atmospheric conditions. Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.7:65-71 '61. (MIRA 15:1)
(Steel--Fatigue)

S/123/62/000/018/002/012
A006/A101

AUTHORS: Babey, Yu. I., Karpenko, G. V.

TITLE: The effect of high-speed and force cutting, and of technical prehistory upon fatigue strength of steel

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 18, 1962, 16, abstract 18A92 ("Nauchn. zap. In-ta mashinoved. i avtomatiki AN UkrSSR, Ser. mashinoved." 1961, v. 8, 41 - 58)

TEXT: It is shown that parts worked on a lathe under different conditions of cutting, assuring equal roughness of the surface, show different endurance limits. High speed cutting conditions increase, and force cutting conditions reduce the endurance limit, as compared with conventional turning in both air and a corrosion medium; this occurs to a particularly high degree in the latter case. Grinding of the parts after turning under different cutting conditions does not eliminate the effect of preliminary machanical treatment upon the endurance limit, i.e. an effect of technical prehistory is observed. This effect upon the fatigue strength of steel is higher in a corrosion medium than in air.

[Abstracter's note: Complete translation]
Card 1/1

S/123/62/000/023/002/008
A004/A101

AUTHORS: Babey, Yu. I., Karpenko, G. V.

TITLE: The effect of mechanical working on the fatigue strength of steel after its preliminary atmospheric corrosion

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 23, 1962, 14, abstract 23A99 ("Nauchn. zap. In-ta mashinoved. i avtomatiki, AN UkrSSR. Ser. mashinoved.", 1961, v. 8, 65 - 71)

TEXT: The authors analyze the effect of mechanical working (ordinary lathe work, forced and high-speed cutting, and also grinding and roller burnishing after ordinary turning) on the fatigue strength of grade 45 steel after preliminary atmospheric corrosion tests of 1,000 hours duration. The tests were conducted on the ИМ А -30 (IMA-30) machine on the base of $10 \cdot 10^6$ cycles. It was proved that various forms of machining lead to different losses in weight from atmospheric corrosion and to different magnitudes of fatigue strength, the surface finish being the same. The most considerable effect on the fatigue strength is exerted by the atmospheric corrosion of specimens that have been

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The effect of mechanical working on... S/123/62/000/023/002/008
A004/A101

machined by forced cutting or grinding; in this case the fatigue strength is reduced by 14 - 16%.

[Abstracter's note: Complete translation]

Card 2/2

KARPENKO, G.V.; STEPURENKO, V.T.

Effect of hydrogen sulfide and polarization on the pasticity of steel. Zhur. prikl. khim. 34 no.5:1057-1060 My '61.
(MIRA 16:8)

(Steel) (Hydrogen sulfide)

KARPENKO, G. V. PHASE I BOOK EXPLOITATION SOV/6170

Karpenko, Georgiy Vladimirovich, and Roman Ivanovich Kripyakevich

Vliyaniye vodoroda na svoystva stali (The Effect of Hydrogen on Steel Properties). Moscow, Metallurgizdat, 1962. 195 p. 4250 copies printed.

Ed. of Publishing House: Ye. N. Berlin; Tech. Ed.: L. V. Dobuzhinskaya.

PURPOSE: This book is intended for scientific and engineering personnel in metallurgy and other branches of industry, engaged in the investigation of the strength and ductility of steel, and also of its electrical and magnetic properties, in connection with possible penetration of hydrogen into steel.

COVERAGE: The book reviews changes in steel properties caused by hydrogen absorbed during electrochemical processes or from gaseous media under conditions of high temperature and pressure. The following topics are discussed: the place and form of occurrence of

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The Effect of Hydrogen on Steel Properties SOV/6170

hydrogen in steel, present ideas on the role of hydrogen in the change of mechanical characteristics of steel under short- and long-time static or repeated load, the effect of hydrogen on some electrical, magnetic, and electrochemical properties of steel, the role of hydrogen in the process of steel fracture, and modern theories of hydrogen embrittlement. No personalities are mentioned. There are 282 references, Soviet and non-Soviet.

TABLE OF CONTENTS:

Card 2/5

MANASEVICH, Arkadiy Davidovich; KARPENKO, G.V., doktor tekhn.nauk, prof., retsenzent; DRAYGOR, D.A., doktor tekhn.nauk, red.; FURER, P.Ya., red.; GORNOSTAYPOL'SKAYA, M.S., tekhn.red.

[Physical principles of the stress condition and strength of metals] Fizicheskie osnovy napriazhennogo sostoianiia i prochnosti metallov. Moskva, Mashgiz, 1962. 196 p. (MIRA 15:5)

(Metals—Testing) (Strains and stresses)

KARPENKO, G.V.

36272
S/021/62/000/004/007/012
D299/D302

10.7400

AUTHORS: Chayevs'kyy, M.Y., and Karpenko, H.V., Corresponding Member of the AS UkrRSR

TITLE: On the mechanism of fatigue failure of steel under the action of external media

PERIODICAL: Akademiya nauk UkrRSR. Dopovidi, no. 4, 1962, 461-464

TEXT: The mechanism of fatigue failure of steel under the adsorptive effect of the medium, is considered. The external media may have the effect of either lowering, or increasing the fatigue strength of steel. Owing to the fact that cracks start developing at the surface of specimens (in the fatigue process), the lifetime of metals under cyclic stresses depends considerably on the external medium and the surface state of the specimen. A figure shows the results of investigations (conducted by the authors) on the effect of Borislav oil on the endurance of steel 20X (20Kh). Thereby, the lifetime of the specimens increased considerably under overloads as well as the endurance limit. Other experiments (by various investigators) have shown that surface-active media which facilitate

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the formation of slip lines, cause a lowering in endurance. With respect to fatigue failure, due to electrochemical corrosion, it was found that if the cyclic stresses are large, the fatigue failure is related to cathode processes; in case of small stresses, it is related to anode processes. The media which most commonly interact with steel, are fusible-alloy melts which are adsorbed. After adsorption, dissolution and diffusion processes take place. The kinetics of these processes depend on various factors (composition of alloy and of steel, ratio of melting points, etc.). A figure shows the results of experiments on the effect of mercury on the endurance of steel Y8 (U8). Here, too, it was found that large cyclic stresses lead to an increase in lifetime, whereas small stresses, close to the fatigue limit, facilitate the formation of slip lines. The use of melts which form (in the surface states of steel) intermetallic compounds, is very promising. Thus, by using the melt Pb-Sn, it is possible to considerably increase the endurance of steel. Under the adsorptive effect of the medium, a kind of inversion of the endurance curves, takes place; thereby the lifetime increases and the fatigue limit decreases. In the case of melts, interacting with steel, the converse happens: The lifetime decreases and the fatigue

limit increases. In conclusion, a thorough knowledge of the effects of the medium, under cyclic stresses, is needed for design of machine parts in many branches of industry. There are 2 figures and 28 references: 14 Soviet-bloc and 14 non-Soviet-bloc (including 1 translation). The 4 most recent references to the English-language publications read as follows: N.F. Mott, Acta metallurgica, 3, 6, 1958; P.J.E. Forsyth, C.A. Stubbington, J. Inst. Metals, 7, 85, 1957; A.H. Cottrell, D. Hull, Proc. Roy . Soc., A, 2, 1229, 1957; National Bureau of Standards, "Technical News", bulletin, 844, 1960.

ASSOCIATION: Instytut mashynoznavstva i avtomatyky AN URSR (Institute of the Science of Machines and Automation of the AS UkrRSR)

SUBMITTED: October 2, 1961

Card 3/3

X

KARPENKO, G.V.

Some principles of the theory of the effect of liquid metals on mechanical properties of solid (construction) metals. Nauch. zap.IMA AN URSR.Ser.mashinoved. 9:5-10 '62. (MIRA 15:12)
(Liquid metals) (Metals—Testing)

STEPURENKO, V.T.; BABEY, Yu.I.; KARPENKO, G.V.

Effect of mercury on the strength and alternating bending testing of steel. Nauch.zap.IMA AN URSR.Ser.mashinoved. 9:34-36 '62. (MIRA 15:12)

(Steel--Testing) (Mercury)

KRIPYAKEVICH, R.I.; BABEY, Yu.I.; KARPENKO, G.V.

Possibility of the occurrence of hydrogen-inducted brittleness of steel during its deformation in neutral corrosion media. Nauch.zap.IMA AN URSR.Ser.mashinoved. 9:47-50 '62. (MIRA 15:12)
(Steel--Corrosion)

STEPURENKO, V.T.; LITVIN, A.K.; KARPENKO, G.V.

Effect of an acid medium and a superposed potential on the alternating bending testing of steel. Nauch.zap.IMA AN URSR. Ser.mashinoved. 9:51-54 '62. (MIRA 15:12)
(Steel--Testing)

BABEY, Yu.I.; KARPENKO, G.V.

Effect of high-speed and heavy-feed machining and of inherited engineering efficiency on the fatigue strength of heat-treated steel 45. Nauch.zap.IMA AN URSR.Ser.mashinoved. 9:55-67 '62. (MIRA 15:12)

(Steel--Fatigue)

31854
S/032/62/028/001/012/017
B116/B108

18.8200

AUTHORS: Maksimovich, G. G., and Karpenko, G. V

TITLE: Micromechanical endurance tests of metals in liquid media with alternating-load machines

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 1, 1962, 91 - 94

TEXT: A procedure and a machine were developed for testing microsamples 1 - 2 mm in diameter on endurance under an alternating load in different media (air, oil activated with 2% oleic acid, 3% NaCl solution, and mercury). Tests with steel (45-type) and ЛС 59-1 (LS59-1) brass microsamples have shown that these media, except mercury, improve the endurance of metals at high stresses. In the new machine, the load applied to the sample has a constant component and an alternating component of lower amplitude than the constant component produced by a mass rotating with the frequencies 50 and 142 cps, respectively. The static load is given by $\sigma_m = 0.4\ \sigma_B$, where σ_B is the endurance. The dynamic load was varied. Before the test, the steel samples were heat-treated in vacuo for 15 min.

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Micromechanical endurance tests...

at 830°C, the brass samples for 2 hrs at 300°C. The brass samples only were tested in Hg. Activated oil did not affect the endurance of steel or brass even after 10^8 cycles. Aqueous NaCl solution reduces the endurance owing to corrosion. Frequency has no effect on the endurance of steel in air and activated oil. Mercury reduces the endurance of brass. There are 3 figures and 6 Soviet references.

ASSOCIATION: Institut mashinovedeniya i avtomatiki Akademii nauk USSR (Institute of Science of Machines and Automation of the Academy of Sciences UkrSSR)

S/020/62/145/001/017/018
B145/B101

AUTHORS: Karpenko, G. V., Babey, Yu. I., and Kripyakevich, R. I.

TITLE: Hydrogen fatigue of steel

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 1, 1962, 144 - 146

TEXT: The fatigue of cyclically stressed steel 45 in 3 % NaCl solutions, during cathodic polarization and anodic polarization and in air, was investigated in order to determine the optimum conditions for cathodic protection and the corrosion resistance of the metal. The cyclic stress was applied by an UMA-30 (IMA-30) machine, ($20 \cdot 10^6$ cycles in the corrosive medium and $10 \cdot 10^6$ cycles in air), the electrolyte being well mixed. The density of the polarization current varied between 0.007 and 6.2 a/dm^2. An endurance limit of cathodic protection (the stress at which destruction does not set in when either the time or the cycles of stress are increased) was not observed. The conventional endurance limit, σ^N_{-1}, decreased with time over the whole region of current density. The function $\sigma^N_{-1} = f(D_c)$,

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Card 2/2

CHAYEVSKIY, M.I. [Chaievs'kyi, M.I.]; KARPENKO, G.V. [Karpenko, H.V.]

Mechanism of the fatigue of steel under the action of external media. Dop. AN URSR no.4:461-465 '62. (MIRA 15:5)

1. Institut mashinostroyeniya i avtomatiki AN USSR. 2. Chlen-korrespondent AN USSR (for Karpenko).
(Steel--Fatigue)

KARPENKO, G.V. [Karpenko, H.V.]; LEONOV, M.Ya.; ROMANIV, O.M.

"Theory of vibrations" by Y.M. Babakov. Reviewed by H.V. Karpenko.
Prykl.mekh. 8 no.3:340-341 '62. (MIRA 15:6)
(Vibration)
(Babakov, Y.M.)

S/676/62/009/000/001/010
A006/A101

AUTHOR: Karpenko, G. V.

TITLE: Some concepts in the theory of the effect of liquid metals upon the mechanical properties of solid (structural) metals

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut mashynoznavstva i avtomatyky, L'viv. Naukhnyye zapiski. Seriya mashinovedeniya. v. 9, 1962, Voprosy mashinovedeniya i prochnosti v mashinostroyenii. no. 8, 5 - 10

TEXT: Liquid metals can change the mechanical properties of solid metals in the following manner: 1) by reducing the surface energy level of the solid metal during the absorption of the liquid metal (the Rehbinder effect). This effect, which can be of a plasticizing or embrittling nature, depends on the intensity of the surface energy reduction and whether the reduction occurs on the surface or inside the solid metal; it depends moreover on the magnitude of stress, predetermining the failure. 2) By the dissolving of solid metal by liquid metal, caused by the heterogeneity of the solid metal; this effect is the same as that of stress concentrators which reduce toughness, endurance and

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Some concepts in the theory of the...

fatigue strength. However, M. I. Chayevskiy has observed the contrary effect, namely that the mechanical characteristics can be improved by the effect of liquid metal, in case when the solid metals already possess stress concentrators. 3) By the formation of a new solid metal, as a result of a solid solution formed during the penetration of liquid metal atoms in the solid metal lattice. These transformations depend on the properties of the new substances and on their effect upon the appearance of compressive or tensile stresses in the surface-adjacent layer of the solid metal. If there are compressive stresses, endurance and fatigue strength are increased, and vice versa. 4) By the formation of a new solid metal, as a result of the chemical interaction of the solid and liquid metals. The author points, in particular, to the heterogeneity of the solid metals and the presence of defects in them, which entail a selective effect of the liquid metals upon considerable volumes of the solid metal. It is pointed out that deformations of the solid metal activate the effect of liquid upon solid metals.

SUBMITTED: May 20, 1961

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S/676/62/009/000/006/010
A006/A101

AUTHORS: Kripyakevich, R. I., Babey, Yu. I., Karpenko, G. V.

TITLE: On the possible appearance of hydrogen brittleness in steel during its deformation in neutral corrosion media

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut mashynoznavstva i avtomatyky, L'viv. Nauchnyye zapiski. Seriya mashinovedeniya. v. 9, 1962, Voprosy mashinovedeniya i prochnosti v mashinostroyenii, no. 8, 47 - 50

TEXT: The decrease of mechanical properties of steel parts under the effect of neutral electrolytes, accompanied by polarization, might be caused by hydrogen. The singling out of hydrogen ions can take place at a sufficient current density of cathode polarization from an external voltage source, or at a sufficient difference of potentials between the micro-electrode sections of the metal surface. Both cases were studied and the nature of metal deformation in the process of hydrogenization was determined. The following 3 cases were investigated: 1) cyclic bending below the yield limit; 2) uni-axial tension be-

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On the possible appearance of...

yond the yield limit; 3) alternating bending beyond the yield limits. The corrosion medium was a 3%-solution of sodium chloride; current density was 0.07 - 15 amp/dm^2; the specimens were made of pre-eutectoid steel. An analysis of the results obtained leads to the following conclusions. In all types of deformation, polarization from the external power source causes a decrease in the mechanical properties. For case 2 and 3 the neutral corrosion medium reduces these indices even without polarization from the external source. The dependence curves of mechanical characteristics show, for all the cases, a maximum in the range of lower current densities. An increase in the current density toward both the anode and cathode reduces the indices of mechanical characteristics, which is explained for the former case by intensified anodic processes and for the latter case by hydrogenization of the metal, entailing hydrogen fatigue and brittleness. The inclination of the curves indicates the predominance of either the anodic or cathodic process, or their equilibrium. As the deformation intensity increases from the first to the third case, the maximum is shifted from the anode to the cathode. This indicates an increasing difference of potentials between the micro-anodic and micro-cathodic sections of the steel surface. As a result, in the third case conditions are developed for the hydrogenization of

On the possible appearance of...

S/676/62/009/000/006/010
A006/A101

the steel over the micro-cathodic sections, even without polarization. To eliminate the cathodic process it is necessary to produce anodic polarization of 0.07 amp/dm^2 current density, which prevents hydrogenization. There is 1 figure.

SUBMITTED: February 7, 1961

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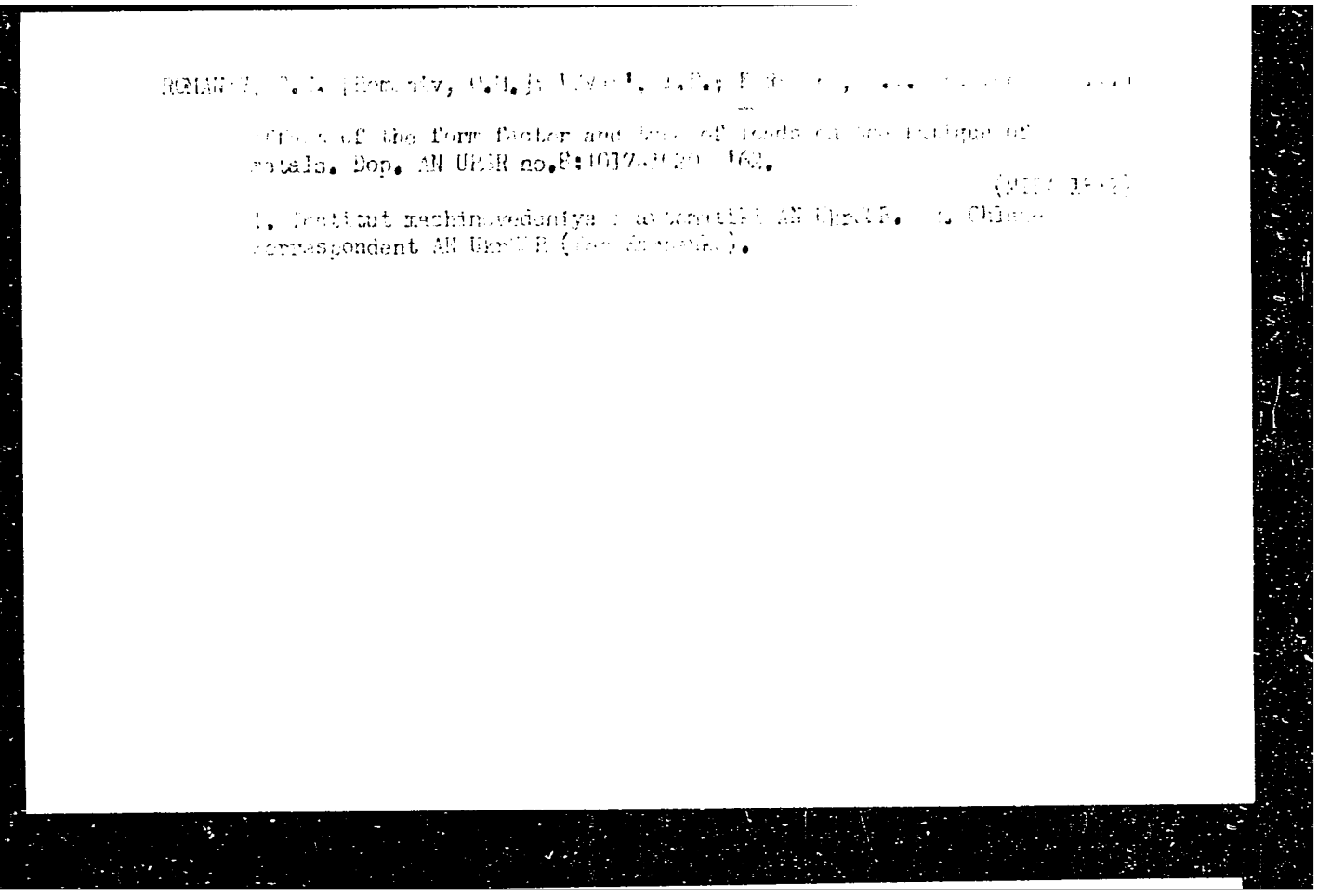

PHASE I BOOK EXPLOITATION SOV/6511

Karpenko, Georgiy Vladimirovich

Prochnost' stali v korrozionnoy srede (Strength of Steel in a Corrosive Medium) Moscow, Mashgiz, 1963. 185 p. 5000 copies printed.

Reviewers: V. I. Likhtman, Doctor of Physical and Mathematical Sciences, Professor; Ed.: P. Ya. Furer; Tech. Ed.: M. S. Gornostaypol'skaya; Chief Ed.(Southern Division, Mashgiz): V. K. Serdyuk, Engineer.

PURPOSE: This book is intended for engineering personnel and scientific research workers.

COVERAGE: The book analyzes the strength of various types of steel in corrosive and aggressive media under short- or long-lasting static or repeated alternating loads and the effect of previous corrosion on the stressed steel. The book reviews these problems in relation to properties of

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steel determined by chemical composition, structure, and treatment. It also analyzes the effect on mechanical properties of steel of anodic and cathodic processes induced by electrochemical corrosion. New data are presented on hydrogen embrittlement of steel caused by a corrosive medium and on corrosion fatigue under lasting static or cyclic load. Chapter V was written by R. I. Kripyakevich. There are 233 references, mostly Soviet.

TABLE OF CONTENTS:

ACCESSION NR: AT4023777 S/2723/63/000/002/0067/0076

AUTHOR: Karpenko, G. V.; Stepurenko, V. T.; Babey, Uy. I.; Shul'te, Yu. A.; Mikhaylov, P. A.

TITLE: Corrosion resistance and fatigue strength of ShKh15 steel after electroslag smelting

SOURCE: AN UkrRSR. Insty*tut mashy*noznavstva i avtomaty*ky*, L'viv. Vliyaniye rabochikh sred na svoystva materialov (Effect of active media on the properties of materials), no. 2, 1963, 67-76

TOPIC TAGS: electroslag steel, electroslag remelting, steel ShKh15, steel corrosion resistance, steel fatigue strength, corrosion, corrosion resistance

ABSTRACT: The Institut elektrosvarki im. Ye. O. Patona AN USSR (Institute of Electric Welding) has developed a method of electroslag smelting which is now in wide use to decrease the number of nonmetallic inclusions and thus increase the corrosion resistance of steel. The purpose of the present paper was to determine the effect of re-smelting on contamination of ShKh15 steel with oxides, sulfides, and air bubbles and the corrosion resistance and corrosion-fatigue strength of this steel, in both the perlite-ferrite and martensite states, in 3% sodium chloride. The results showed that electroslag

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ACCESSION NR: AT4023777

smelting of ShKh15 steel in the ZMI machine decreased the content of impurities by 2-2.5 units and the porosity at the center by 0.5 units. As shown in the Enclosure, smelting increased corrosion resistance by up to 15% in 3% sodium chloride, but increased it only insignificantly in air. Smelting increased the corrosion-fatigue strength of ShKh15 steel by up to 40% in the martensitic hardened condition and by up to 20% before hardening. However, lowering the quantity of impurities below a certain value did not affect the corrosion and corrosion-fatigue strength of the steel. "The thermal treatment was carried out by F. P. Yanchishin (Cand. Tech. Sci.) and Eng. K. P. Tabinskiy." Orig. art. has: 4 figures, 4 tables and 3 formulas.

ASSOCIATION: Insty*tut mashy*noznavstva i avtomaty*ky*, AN UkrSSR , Lvov (Institute of Machine Technology and Automation, AN UkrSSR)

SUBMITTED: 00 DATE ACQ: 10Apr64 ENCL: 01

SUB CODE: MM NO REF SOV: 004 OTHER: 000

2/3

Card

ACCESSION NR: AT4023777

ENCLOSURE: 01

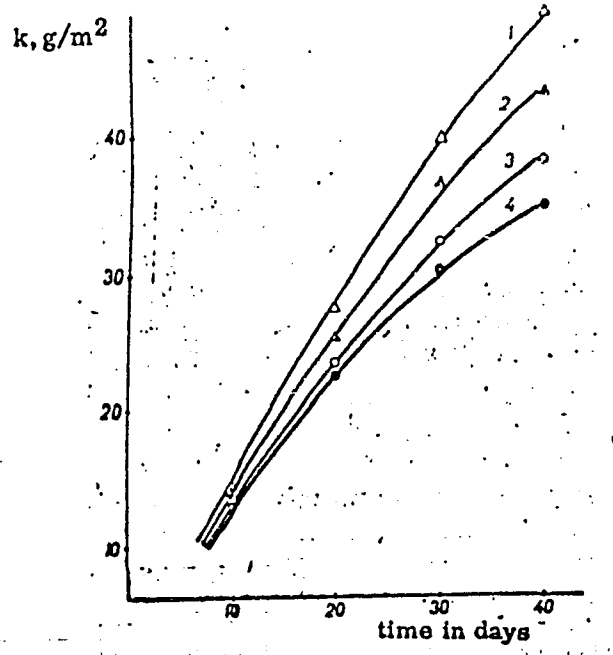

Fig. 1 - Corrosion losses of steel ShKh15 in relation to time in 3% sodium chloride:

1 - steel from a usual smelt (melt No. 314822), perlite-ferrite; 2 - steel after electroslag smelting (melts No. 18, 28, 33), perlite-ferrite; 3 - steel from a usual smelt (melt No. 314822), martensite; 4 - steel after electro-slag smelting (melts No. 46, 48, 53), martensite.

Card 3/3

BARSY, Ya.T.; [illegible]LENKO, V.T.; KARPENKO, G.V.

Effect of mechanical working and inherent properties on the corrosion resistance and fatigue strength of steel following its preliminary corrosion. Vliian.rab. sred na svoĭst. mat. no.2:77-86 '63. (MIRA 17:10)

KARPENKO, G.V.; BABEY, Yu.I.

Effect of mechanical working on the adsorption fatigue of steel. Fiz.-khim.mekh.mat. [illegible] [illegible]

(MIRA [illegible])

[illegible], M.M.; [illegible], G.V.

Changes in the work function of an electron from polycrystalline alpha-iron under the effect of cathodically reduced hydrogen. Vliian.rab. sred na svoi. mat. no.2:159-162 '63.

(MIRA 17:10)

KARPENKO, G.V. [Karpenko, H.V.]; STEPURENKO, V.T.; BABEI, Yu.I. [Babei, IU.I.]

Dependence of the corrosion fatigue strength of steel on test conditions. Dop. AN URSR no.3:366-368 '63. (MIRA 17:10)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR. 2. Chlen-korrespondent AN UkrSSR (for Karpenko).

S/021/63/000/003/015/022
D405/D301

AUTHORS: Karpenko, H. V., Corresponding Member of the Academy of Sciences UkrRSR, Stepurenko, V. T. and Babey, Yu.I.

TITLE: Dependence of corrosion fatigue strength of steel on test conditions

PERIODICAL: Akademiya nauk UkrRSR. Dopovidi. no. 3, 1963, 366-368

TEXT: Corrosion fatigue tests were carried out with the purpose of showing that the endurance limit of steel varies considerably as a function of testing conditions such as the form in which the corrosive medium is supplied, its mixing, and the inflow of air (oxygen). Structural steel 40 of composition 0.37% C, 0.20% Si, 0.72% Mn, 0.073% Cr, 0.02% P, and 0.036% S, was tested for corrosion fatigue on the machine МУИ-6000(MUI-6000), by pure bending, the specimen revolving in air and in a 3% NaCl solution respectively. The test comprised 5 million load cycles in air and 20 million load cycles in the corrosive medium. By attaching a special device to the testing machine it was possible to carry out the tests under

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Dependence of corrosion ...

the following conditions: In a flowing solution without access of air, in same with access of air, in differently mixed media, by wetting the specimen continuously or periodically. The experiments showed that increased inflow of oxygen (from air) into a corrosive medium , such as a 3% NaCl solution, reduces considerably the endurance of steel; the more intense the medium is mixed, the less the endurance. In tests with distilled water the opposite effect was observed: the greater the inflow of oxygen into the corrosive medium, the higher the endurance of the steel. In corrosion fatigue tests of steel cathode protection (in a 3% NaCl solution) it was found that in a medium at rest it is possible to achieve almost complete protection of steel cathodes, whereas in a moving medium they cannot be protected. On the basis of the obtained results the following reccmmendations are made: a) Consideration should be made in corrosion-fatigue tests also of the form in which the corrosive medium is supplied, in addition to the other details relating to specimen and medium; b) In corrosion fatigue tests of metals the actual manufacturing conditions should be simulated exactly. There is 1 figure.

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Dependence of corrosion ...

S/021/63/000/003/015/022
D405/D301

ASSOCIATION: Instytut mashynoznavstva ta avtomatyky AN URSR (Institute of the Science of Machines and Automation of the AS UkrRSR)

SUBMITTED: June 25, 1962

Card 3/3

POKHMURSKIY, V.I. [Pokhmurs'kyi, V.I.]; KARPENKO, G.V. [Karpenko, H.V.]

Thermomechanical processing of steel using torsional deformation. Dop. AN URSR no.12:1600-1602 '63. (MIRA 17:9)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR. 2. Chlen-korrespondent AN UkrSSR (for Karpenko).

ACCESSION NR: AP4009736 S/0021/63/000/012/1600/1602

AUTHOR: Pokhmurs'ky*y, V. I.; Karpenko, G. V. (Corresponding member)

TITLE: Thermo-mechanical treatment of steel utilizing torsion deformation

SOURCE: AN UkrRSR. Dopovidi, no. 12, 1963, 1600-1602

TOPIC TAGS: thermo-mechanical treatment, steel, steel 45, torsion deformation, strength increase, corrosion resistance improvement, high-temperature austenization, low-temperature annealing, medium-carbon steel, structural steel, torsion-strengthened steel

ABSTRACT: The authors selected torsion for thermomechanical treatment of steels as a type of plastic deformation which permits considerable deformation without noticeable cross-section changes. They analyzed the effect of plastic deformation by torsion, in the process of thermomechanical treatment, on the change in strength, hardness, plasticity, structure and corrosion resistance of steel 45 austenized at 1170 - 1190K. The maximum increase in strength (fatigue limit up to 2.38 hectonewtons /m^2) was observed for an angle of torsion α = 0.89 rad/mm and low annealing temperature (383-500K). Increase of annealing temperature (573-673K) and increase in the degree of deformation (0.264 - 0.485 rad/mm) led to the annulment of the

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ACCESSION NR: AP4009736

strengthening effect (see Fig. 1 of Enclosure). Changes in strength were accompanied by corresponding changes in hardness without noticeable changes in plasticity. Corrosion resistance of thermomechanically treated steel 45 is considerably greater than the corrosion resistance of the control samples (see Fig. 2 of Enclosure). Metallographic studies showed increase in the dispersion structure of the thermomechanically treated steel as compared with conventional hardening. Plastic deformation of austenite reduces precipitation of finely dispersed carbides from martensite during the low-temperature annealing (383K) and increases its thermal stability. This then leads to an increased corrosion resistance. Orig. art. has: 2 figures.

ASSOCIATION: Insty*tut Mashy*noznavstva ta Automaty*ky AN URSR (Institute of Mechanical Engineering and Automation AN URSR)

SUBMITTED: 15Mar63 DATE ACQ: 03Feb64 ENCL: 02

SUB CODE: ML NO REF SOV: 000 OTHER: 000

Card 2/2

L 11420-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

S/032/63/029/005/010/022

55

AUTHORS: Karpenko, G.V., Stepurenko, V.T. and Babey, Yu. I.

TITLE: On the method of testing metals for corrosion fatigue

PERIODICAL: Zavodskaya laboratoriya, v. 29, no. 5, 1963, 583-584

TEXT: As a rule, in the literature on testing metals for corrosion there are no indications of the access of atmospheric oxygen to the corrosive medium or of the degree of mixing of the medium. The tests made in the present work show that these factors, and the method of application of the corrosive medium to the test piece, have a substantial effect on the results. There is 1 figure.

ASSOCIATION: L'vovskiy institut mashinovedeniya i avtomatiki (L'vov Institute of the Mechanical Engineering and Automation)

ja/Cb

Card 1/1

KARPENKO, G.V.; CHAYEVSKIY, M.I.

Effect of the time factor in mechanical testing in active media.
Zav.lab. 29 no.5:596-597 '63. (MIRA 16:5)

1. Institut mashinovedeniya i avtomatiki AN UkrSSR.
(Metals--Testing)

KARPENKO, G.V., red.; VITVITSK[illegible], [illegible]

[Corrosion fatigue of m[illegible] [illegible] of [illegible]] Korrozionnaia ustalost' [illegible]; sbornik dokladov. L'vov, Kamenіar, 1964. [illegible] (MIRA 18:11)

1. Vsesoyuznoye soveshchaniye [illegible] korrozionnoy ustalosti metallov, Lvov, 1962. 2. [illegible]-korrespondent AN Ukr.SSR i Institut mashinovedeniya i [illegible]matiki AN Ukr.SSR (for Karpenko).

KUSLITSKIY, A.B.; BABEY, Yu.I.; SEREBRIYSKIY, E.I.; MIZETSKIY, V.L.; BORISOV, A.Ya.; KARPENKO, G.V.

Effect of the temperature of hardening on the fatigue strength of ShKh15 steel prepared by electric slag and vacuum remelting. Vliian. rab. sred na svoist. mat. no.3:107-118 '64. (MIRA 17:10)

BABEY, Yu.I.; ROMANIV, O.N.; KARPENKO, G.V.

Effect of torsioonal cold hardening on the fatigue resistance of steel. Vop. mekh. real'. tver. tela no. 2:155-161 '64. (MIRA 17:9)

KARPENKO, G.V.

New aspects of the problem of strength and plasticity in connection with the necessity of taking into account the influence of the medium. Vestn. mash. 42 no.3:5-12 '62. (MIRA 15:3)

L 62078-65 EPF(c)/EWP(k)/EWP(z)/EWT(d)/EWT(m)/EW:(h)/EWP(b)/T/EWA(d)/EWP(1)/EWP(w)/EWP(v)/EWP(t) Pf-4 MJW/JD/WB

ACCESSION NR: AR5014030 UR/0277/65/000/003/0011/0011
669.14.018: 539.434:669.788

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3.48.80

AUTHOR: Kripyakevich, R.I.; Babey, Yu. L.; Karpenko, G.V.

TITLE: Hydrogen fatigue of steel

CITED SOURCE: Sb. Korrozion. ustalost' metallov. L'vov, Kamenyar, 1964, 37-43

TOPIC TAGS: hydrogen fatigue, cathodic polarization, electrolyte agitation, steel fatigue

TRANSLATION: The authors carried out a study of the phenomenon of hydrogen fatigue of steel No. 45 in a corrosive environment during cathodic or anodic polarization, using samples with ϑ = 20 mm in a simple bending test with rotation on an IMA-30 tester. A reduction of nominal fatigue strength with time was noted in all cases of cathodic protection. An increase in current density within defined limits produced an increase in nominal fatigue strength. Cathodic protection failed to restore corrosion fatigue strength values to their levels in air when the electrolyte was agitated.

Card 1/1 SUB CODE: MM ENCL: 00

L 32056-65 EWT(m)/EWP(w)/EPF(c)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(b) Pr-4/Pu-4
IJP(c) MJW/JD/WB/GG

ACCESSION NR: AT4049939 S/2723/64/000/003/0048/0051

AUTHOR: Teterskiy, V. A.; Soshko, A. I.; Tyutnyuy, A. N. (Candidate of technical sciences); Karpenko, G. V. (Corresponding member AN UkrSSR)

TITLE: Effects of radiation in gas media on the mechanical properties of steel

SOURCE: AN UkrSSR. Fiziko-mekhanicheskiy institut. Vliyaniye rabochikh sred na svoystva materialov, no. 3, 1964, 48-51

TOPIC TAGS: radiation corrosion, irradiated gas, steel corrosion, activated gas corrosion, thallium 204, beta radiation, steel mechanical property / steel 08kp

ABSTRACT: Most radiation, such as alpha, beta and gamma rays, does not have a direct effect on metal; only neutrons can significantly affect the strength and life of mechanical components. However, there is an indirect effect of radiation on the mechanical properties of metals, due to interaction with the environment. Irradiation of aqueous media may produce long-and short-lived products leading to metal corrosion and decreased strength. Both long-lived compounds of the hydrogen peroxide type and short-lived free-radical type compounds are encountered. In the present study, hydrogen and air were irradiated and tested for their effect on

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L 32056-65

ACCESSION NR: AT4049939

steel strength and corrosion. Thallium 204 was used as the source of beta rays at an intensity of 600 microcuries and an energy of 0.765 Mev. The apparatus consisted of a high pressure bomb containing the source, medium and test samples. The results, reported for steel 08kp, show that the tensile and shear strength of the material were unaffected by the ionized gases. However, the length of the plasticity plateau was decreased significantly (by 25 - 37%). Relative elongation was unchanged in ionized air, but decreased about 6% in ionized hydrogen. Orig. art. has: 2 tables and 2 figures.

ASSOCIATION: None

SUBMITTED: 20Jun63 ENCL: 00 SUB CODE: MM, NP

NO REF SOV: 004 OTHER: 000

Card 2/2

L 32057-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(b) Pf-4 MJW/JD/HW

ACCESSION NR: AT4049941 S/2723/64/000/003/0070/0074 30

AUTHOR: Pokhmurskiy, V. I.; Karpenko, G. V. (Corresponding member AN UkrSSR) 8+1

TITLE: Effect of the conditions of thermomechanical treatment on the corrosion resistance of steels 18 18

SOURCE: AN UkrSSR. Fiziko-mekanicheskiy institut. Vliyaniye rabochikh sred na svoystva materialov, no. 3, 1964, 70-74

TOPIC TAGS: corrosion resistance, thermomechanical, strain hardening, steel strength, steel corrosion, torsional plastic deformation / steel 45, steel 60S2 18 18

18 ABSTRACT: The authors studied the effect of thermomechanical treatment on the corrosion resistance of steels 45 and 60S2 in 54% aqueous sulfuric acid. The thermomechanical treatment consisted of rapid heating at 30C per second, torsional plastic deformation at varying rates and subsequent oil tempering. The exposure to a corrosive medium was continued for 10^4 seconds at a constant temperature. Optimum strength was found to be produced by a torsional gradient of 0.079 radians/millimeter. A significant increase in corrosion resistance was produced by low temperature tempering (110-220C), while tempering temperatures of 300 - 400C re-

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L 32057-65

ACCESSION NR: AT4049941

sulted in practically no improvement. Metallographic studies showed that the optimum conditions of thermomechanical treatment involved small torsional deformations. These derange the microstructure insignificantly, but prevent the development of carbides, thus decreasing the number of microelements and leading to enhanced corrosion resistance. Large deformations were also found to attenuate carbide production, but significantly deranged and activated the microstructure, thus leading to decreased corrosion resistance. It is concluded that optimized conditions of thermomechanical treatment can enhance both the strength and the corrosion resistance of steels. Orig. art. has: 2 tables and 3 figures.

ASSOCIATION: None

SUBMITTED: 20Jun63 ENCL: 00 SUB CODE: MM

NO REF SOV: 006 OTHER: 000

Card 2/2

L 55859-65 EWT(d)/EWT(m)/EWP(w)/EWP(v)/EWA(d)/T/EWP(t)/EWP(l)/EWP(b)/EWP(s)/EWP(k)/
EWP(h)/EPF(c) Pf-4 MJW/JD/WB

ACCESSION NR: AR5014027 UR/0277/65/000/003/0011/0011 41
669.14.018:620.194.8 40
B

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3.48.77

AUTHOR: Babey, Yu. I.; Stepurenko, V. T.; Karpenko, G. V.

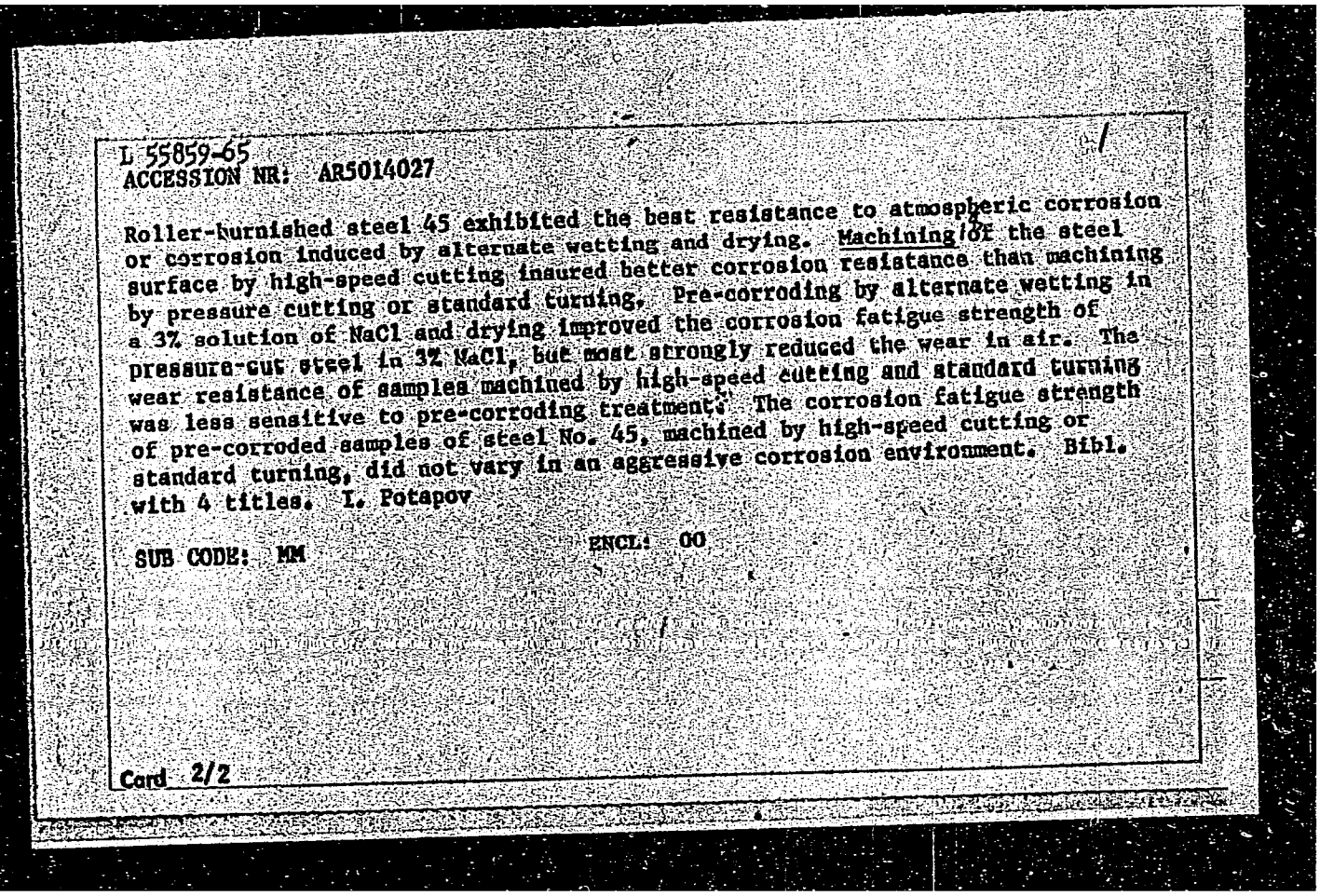
TITLE: Effect of pre-corroding on the fatigue strength of steel

CITED SOURCE: Sb. Korrozion. ustalost' metallov. L'vov, Kamenyar, 1964, 74-87

TOPIC TAGS: precorrosion treatment, corrosion fatigue, steel corrosion, surface machining, saline corrosion, atmospheric corrosion, steel fatigue, aggressive environment / steel No. 45

TRANSLATION: The study concerned the resistance of variously treated and machined steel No. 45 against atmospheric corrosion and corrosion caused by periodic wet ring in a 3% solution of NaCl, as well as the effect of these types of pre-corroding treatment on the subsequent fatigue strength of steel in relation to machining operations. Fatigue tests were carried out on UMA-30 fatigue testers, using $10 \cdot 10^6$ cycles in air and $50 \cdot 10^6$ cycles in the corrosive environment as a basis.

Card 1/2



L 55859-65
ACCESSION NR: AR5014027

Roller-burnished steel 45 exhibited the best resistance to atmospheric corrosion or corrosion induced by alternate wetting and drying. Machining of the steel surface by high-speed cutting insured better corrosion resistance than machining by pressure cutting or standard turning. Pre-corroding by alternate wetting in a 3% solution of NaCl and drying improved the corrosion fatigue strength of pressure-cut steel in 3% NaCl, but most strongly reduced the wear in air. The wear resistance of samples machined by high-speed cutting and standard turning was less sensitive to pre-corroding treatment. The corrosion fatigue strength of pre-corroded samples of steel No. 45, machined by high-speed cutting or standard turning, did not vary in an aggressive corrosion environment. Bibl. with 4 titles. I. Potapov

SUB CODE: MM ENCL: 00

Card 2/2

L 55857-65 EWT(m)/EPF(c)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b)/EWP(z) MJW/JD/WB

ACCESSION NR: AR5014025 UR/0277/65/000/003/0010/0010
620.178.3:669-426

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3.48.73

AUTHOR: Karpenko, G. V.; Stepurenko, V. T.; Babey, Yu. I.

TITLE: Corrosion fatigue strength of ShKh15 steel after electroslag remelting

CITED SOURCE: Sb. Korrozion. ustalost' metallov, L'vov, Kamenyar, 1964, 105-112

TOPIC TAGS: electroslag remelting, corrosion fatigue, corrosion resistance, impurity content, steel fatigue, saline corrosion / ShKh15 steel

TRANSLATION: The study concerned the effects of electroslag remelting of ShKh15 steel on the content of impurities (oxides, sulfides and globules), as well as on corrosion resistance and corrosion fatigue strength of the steel in a 3% solution of NaCl. Electroslag remelting increased the corrosion resistance of the steel in 3% NaCl (up to 15%). Improvement of endurance in air was slight, but the process produced a significant increase of the corrosion fatigue strength of martempered (up to 40%) and normalized (up to 20%) steel. Bibl. with 4 titles.

SUB CODE: MM ENCL: 00

Card 1/1

L 23446-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) MJW/JD

ACCESSION NR: AT4049945 S/2723/64/000/003/0107/0118

AUTHOR: Kuslitskiy, A.B.; Babey, Yu. I.; Serebriyskiy, E.I.; Mizetskiy, V.L.; Borisov, A. Ya.; Karpenko, G.V. (Corresponding member AN UkrSSR)

TITLE: Effect of the hardening temperature on the fatigue strength of ShKh15 steel from electroslag and vacuum refining

SOURCE: AN UkrSSR. Fiziko-mekhanicheskiy institut. Vliyaniye rabochikh sred na svoyata materialov, no. 3, 1964, 107-118

TOPIC TAGS: steel fatigue strength, hardening temperature, electroslag steel, vacuum smelted steel, steel purity/ ShKh 15 steel

ABSTRACT: This study was prompted by the lack of data concerning the physical and mechanical properties of electroslag steel (see, e.g., B. Ye. Paton, B.I. Medovar, Yu. V. Latash, Stal', no. 11, 1962) and by the inconclusive results concerning such properties of vacuum smelted steels (see, e.g., H.B. Nudelman, J. Sheehan, A study of the effect of melting practice on the fatigue behavior of high-strength steel. Armour Res. Foundat., Chicago, 1961). The maximum cyclic hardness of ShKh15 steel was tested after a, electroslag smelting followed by vacuum smelting (very pure ShKh15 -

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L 23446-65

ACCESSION NR: AT4049945

free from nonmetallic admixtures); b. the same as (a) but less pure (ShKh15S); c. electro-slag smelting only (ShKh15Sh); d. ordinary smelting in an open electric oven (ShKh15); e. double vacuum arc smelting of pure steel (ShKh15Ch); and f. the same as (c) with an ordinary smelt (ShKh15D). The optimum hardening temperature for the ShKh15S and ShKh15D steel was 850C while all the other steels showed maximum cyclic hardness after hardening at 840C (all samples were annealed at 150C during a 2-hour period). The cyclic hardness of the air-hardened ShKh15 steel from different types of smelts depended on the presence of nonmetallic admixtures as well as on its density. An increase in purity and in density led to a 25-30% increase in fatigue strength. "The degree of contamination of the steel with non-metallic impurities was evaluated by Engineer N.I. Zukhodskaya; Engineer B.F. Ryabov took part in developing and setting up the system of automatic furnace temperature control." Orig. art. has: 3 figures and 5 tables.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 020 OTHER: 004

Card 2/2

L 62072-65 EPF(c)/EWP(k)/EWP(z)/EWT(d)/EWT(m)/EWP(h)/EWP(b)/EWA(d)/EWP(l)/EWP(v)/EWP(t) Pf-4 MJW/JD/WB

ACCESSION NR: AR5014035 UR/0277/65/000/003/0030/0030 30 9

620.194.8

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3.48.224

AUTHOR: Karpenko, G.V.; Stepurenko, V.T.; Babey, Yu. L.

TITLE: Methodology of corrosion fatigue testing of metals

CITED SOURCE: Sb. Korroziya. ustalost' metallov. L'vov, Kamenyar, 1964, 155-161

TOPIC TAGS: steel corrosion fatigue, corrosive medium feed, atmospheric oxygen, cathodic shielding, structural steel, fatigue testing, steel passivity

TRANSLATION: The authors investigated the effects of corrosion medium feed pattern, agitation of the medium and access of air on the corrosion fatigue of structural steel No. 40, employing the tester MUI-6000 for simple bending tests with rotation in air, a 3% solution of NaCl and distilled water (N = 5 million cycles in air and 20 million cycles in corrosive media). The more intensive the agitation of the corrosive medium and the greater the access of atmospheric oxygen, the greater the decrease in steel fatigue

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L 62072-65

ACCESSION NR: AR5014035

strength in 3% NaCl. Free access of atmospheric oxygen passivates the steel during tests in distilled water, so that its fatigue strength increases when compared with tests with impeded access of air. The conditions under which experiments on cathodic shielding of steel from corrosion fatigue in 3% NaCl are carried out can significantly affect the results obtained in such tests, i.e. nearly total protection of the steel is attained in a corrosive medium at rest, while protection can not be obtained in a medium in motion. It is recommended that only such data on corrosion fatigue tests be considered which indicate the method of corrosive medium feed to the samples along with the characteristics of the tested material and medium, type of stress applied, and number and frequency of the cycles.

SUB CODE: MM ENCL: 00

Card 2/2

L 55858-65 EWT(m)/EWP(w)/EPF(c)/EWA(d)/T/EWP(t)/EWP(k)/EWP(b)/EWP(z) Pf-4

ACCESSION NR: AR5014026 UR/0277/65/000/003/0011/0011 MJW/JD/WB 27 B

620.194.8:620.14.018

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3. 48.76

AUTHOR: Babey, Yu. I.; Chernyy, V. G.; Karpenko, G. V.

TITLE: The condition of a steel surface after machining and its effect on corrosion fatigue strength

CITED SOURCE: Sb. Korroziya. ustalost' metallov. L'vov, Kamenyar, 1964, 172-193

TOPIC TAGS: steel fatigue strength, corrosion fatigue, steel surface, steel machining, high speed machining, pressure cutting / steel No. 45

TRANSLATION: The article lists the results of a study of the effects of various machining processes (pressure, standard and high-speed turning, grinding) on the fatigue strength of steel No. 45 in air and in a corrosive environment (3% solution of HCl). Samples machined by high-speed turning showed better fatigue strength in air or corrosive media than samples machined at normal speeds. Pressure cutting reduced fatigue strength sharply and the deterioration of corrosion

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L 55858-65

ACCESSION NR: AR5014026

fatigue strength was even greater. The improved fatigue and corrosion fatigue strengths of samples after high-speed cutting, as compared to the other named processes, is attributed to better physical and mechanical properties of surface layers of the metal, whose effect is greater than that of surface microgeometry. Bibl. with 25 titles; 3 illustrations and 4 tables.

SUB CODE: MM ENCL: 00

Card 2/2

ROMANIV, O.N.; VYVAL', I.P.; KARPENKO, G.V.

Fatigue resistance of metals sub ected to two kinds of bending loading. Vop. mekh. real. tver. tela no.3:179-187 '64.
(MIRA 17:11)

L 55862-65 EWT(m)/EWP(w)/EPF(c)/EWA(d)/T/EWP(t)/EWP(b) JD/WB

ACCESSION NR: AR5014022 UR/0277/65/000/003/0004/0004 18 B
620.194.8.001.1

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3.48.23

AUTHOR: Karpenko, G. V.

TITLE: The theory of fatigue failure of metal in corrosive environments

CITED SOURCE: Sb. Korrozion. ustalost' metallov. L'vov, Kamenyar, 1964, 5-15

TOPIC TAGS: corrosion fatigue, metal corrosion, fatigue failure, fatigue theory

TRANSLATION: A qualitative interpretation of a number of phenomena occurring in corrosion fatigue is given from the standpoint of mechanical, electrochemical (corrosion), adsorption and absorption (hydrogen absorption) theories. The significance of each theory in clarifying the process of corrosion fatigue depends on the magnitude of the cyclic stress amplitude. It is noted that stated hypotheses on corrosion fatigue provide only a qualitative explanation of the corrosion fatigue mechanism, but do not yield quantitative data for use in calculations. Bibl. with 14 titles.

SUB CODE: MM ENCL: 00

Card 1/1 alm

L 11327-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) MJW/JD

ACCESSION NR: AP4043731 S/0021/64/000/008/1063/1066

AUTHOR: Karpenko, G. V. (Corresponding member AN UkrSSR); Kusly*ts'ky*y, A. E. (Kuslitskiy, A. E.); Babey, Yu. I.

TITLE: Effect of the density of electroslag and vacuum-melted ball-bearing ShKh15 steel on its fatigue strength

SOURCE: AN UkrRSR. Dopovidi, no. 8, 1964, 1063-1066

TOPIC TAGS: ball bearing steel, ShKh15 steel, electroslag melted steel, vacuum melted steel, steel fatigue strength, steel density, steel purity

ABSTRACT: The effect of nonmetallic inclusions and density on the fatigue strength of ball-bearing ShKh15 steel [AISI E52100] has been investigated. The steel was made by: 1) melting in an open electric arc furnace, 2) electroslag melting, 3) electroslag and subsequent vacuum melting, 4) electroslag and subsequent double vacuum melting, 5) double vacuum melting, and 6) double vacuum melting from virgin charge materials. All the steels prepared had a standard chemical composition and a hardness of 61-63 HRC after quenching. Density was measured in quenched and fatigue strength, in annealed specimens.

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ACCESSION NR: AP4043731

Fatigue tests revealed no definite relationship between the presence of individual nonmetallic inclusions in ShKhlS steel and its fatigue strength. The density-fatigue strength test data show that fatigue strength increases as the steel density increases, and that the influence of the density is more pronounced in steels with fewer nonmetallic inclusions. In steels with practically identical amounts of nonmetallic inclusions, fatigue strength increased 23% with an increase in density from 7.7990 to 7.8116 g/cm^3, or ~0.15%. Hence, for a more complete evaluation of the serviceability of ball-bearing steel, both the content of nonmetallic inclusions and the steel density should be taken into account. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Inaty*tut mashy*nosnavstva ta avtomaty*ky* AN URSR (Institute of Machine Science and Automation, AN URSR)

SUBMITTED: 16Dec63 ATD PRESS: 3100 ENCL: 00

SUB CODE: MM,IE NO REF SOV: 008 OTHER: 003

Card 2/2

L 19623-65 EPA(s)-2/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EPA(bb)-2/
EWP(b) Pf-4/Pt-10 ASD(f)-2/AFMDC/ASD(m)-3 HJW/JD/WB/EM

ACCESSION NR: AP4047507 S/0129/64/000/010/0028/0031

AUTHOR: Karpenko, G. V.; Meyerson, I. L.; Babey, Yu. I.; Tabinskiy, K. P.; Kusiitskiy, A. B.

TITLE: Corrosion and corrosion fatigue resistance of Kh17N2 and SN3 steels

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 10, 1964, 28-31, and bottom half of insert facing p. 40

TOPIC TAGS: stainless steel, steel corrosion, steel corrosion fatigue, precipitation hardenable steel, Kh17N2 steel, SN2 steel, steel corrosion resistance, steel corrosion fatigue resistance, anticorrosion coating, 302 varnish

ABSTRACT: The corrosion and corrosion fatigue of Kh17N2 (0.12%C, 17.23% Cr, 1.84% Ni) and SN3(0.09%C, 16.93% Cr, 4.71% Ni, 3.31% Mo) stainless steel have been investigated. Steels were heat-treated to a hardness of 38--40 and 40--42 HRC, respectively. The test results showed that the SN3 steel has a higher corrosion resistance than the Kh17N2 steel, e.g., by 2.5 times in 53% sulfuric acid. The SN3 fatigue strength in air

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ACCESSION NR: AP4047507

is 10% higher than that of the Kh17N2 steel. In a 3% sodium-chloride solution, the fatigue strength of both steels decreases by about the same factor, compared with that in air (see Fig. 1 of the Enclosure) and at $N = 2 \cdot 10^7$ cycles, is about 2 times lower than that in air. This confirms the absence of a direct relation between the corrosion resistance and the corrosion fatigue resistance of the metal. The SN3 steel is preferable to Kh17N2 steel for compressor blades working in aggressive media. Coating with 302 varnish (composition unidentified) increases by 1.5 times the corrosion fatigue strength of Kh17N2 and SN3 steels. Orig. art. has: 2 figures.

ASSOCIATION: Fiziko-mekhanicheskiy institut AN UkrSSR(Physiomechanical Institute AN UkrSSR)

SUBMITTED: 00 ENCL: 01 SUB CODE: MM

NO REF SOV: 009 OTHER: 000

Card 2/3

L 19623-65
ACCESSION NR: AP4047507

ENCLOSURE: 01

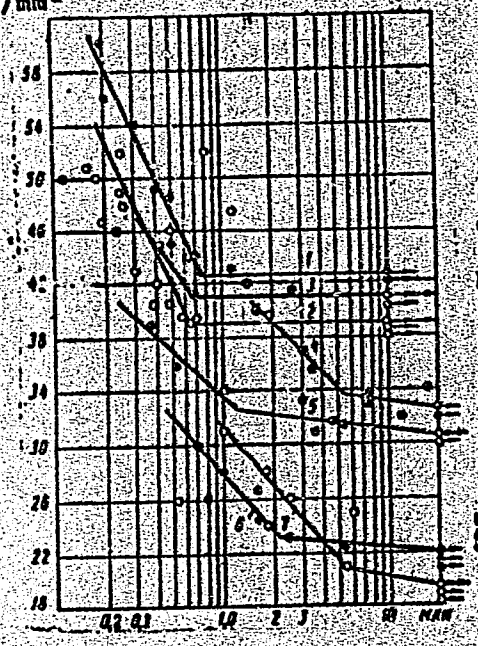

Fig. 1. Fatigue curves of uncoated (1,6) and 302 varnish-coated (4) SN3 steel, and uncoated (2,7) and 302 varnish-coated (3) Kh17N2 steel in air (1,2,3) and in a 3% solution of sodium chloride (4,5,6,7).

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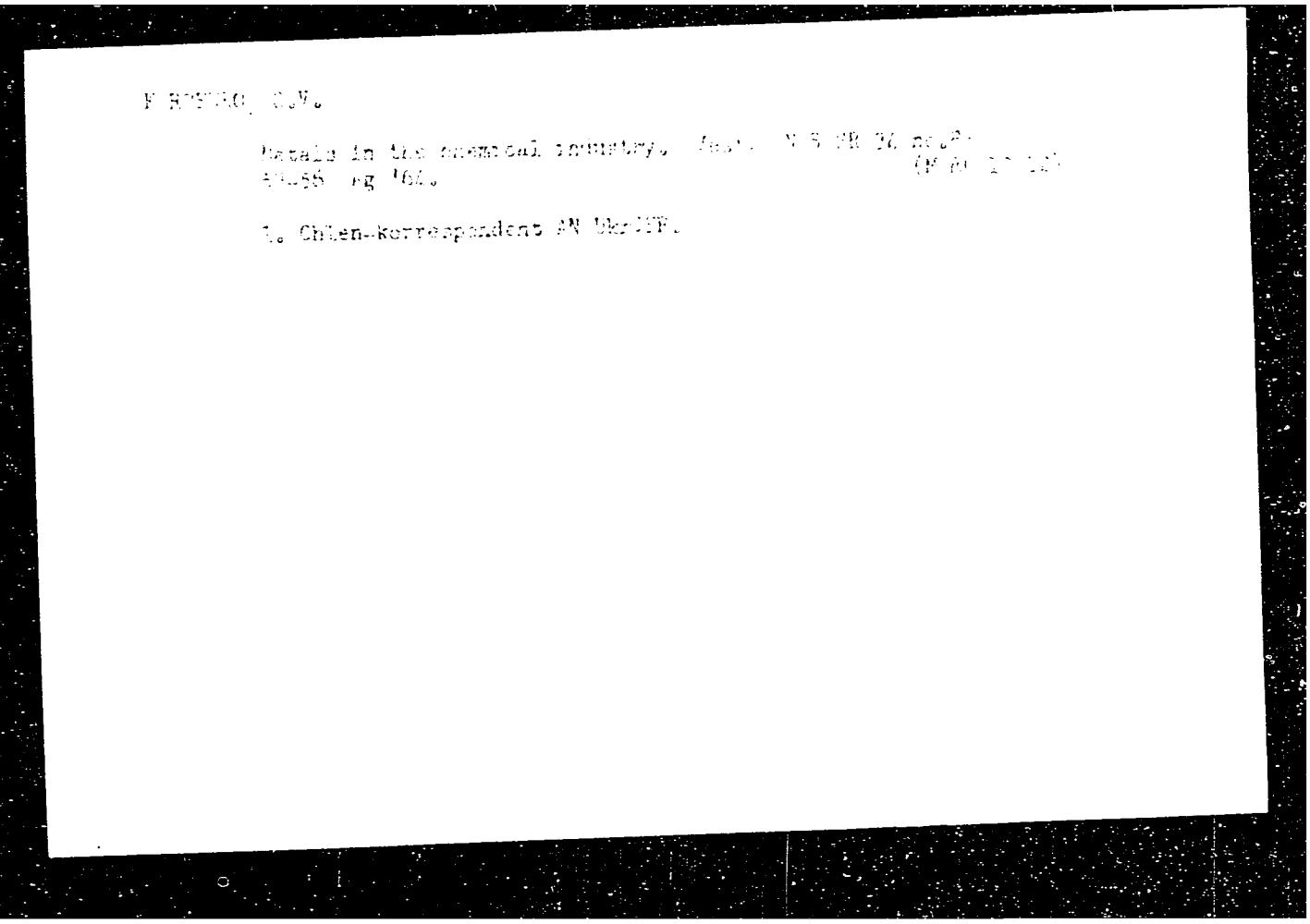

L 62078-65 EPF(c)/EWP(k)/EWP(z)/EWT(d)/EWT(m)/EW:(h)/EWP(b)/T/EWA(d)/EWP(1)/EWP(w)/EWP(v)/EWP(t) Pf-4 MJW/JD/WB

ACCESSION NR: AR5014030 UR/0277/65/000/003/0011/0011
669.14.018:539.434:669.788

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin. Gidroprivod. Otdel'nyy vypusk, Abs. 3.48.80

AUTHOR: Kripyakevich, R.I.; Babey, Yu. I.; Karpenko, G.V.

TITLE: Hydrogen fatigue of steel

CITED SOURCE: Sb. Korrozion. ustalost' metallov. L'vov, Kamenyar, 1964, 37-43

TOPIC TAGS: hydrogen fatigue, cathodic polarization, electrolyte agitation, steel fatigue

TRANSLATION: The authors carried out a study of the phenomenon of hydrogen fatigue of steel No. 45 in a corrosive environment during cathodic or anodic polarization, using samples with ϕ = 20 mm in a simple bending test with rotation on an IMA-30 tester. A reduction of nominal fatigue strength with time was noted in all cases of cathodic protection. An increase in current density within defined limits produced an increase in nominal fatigue strength. Cathodic protection failed to restore corrosion fatigue strength values to their levels in air when the electrolyte was agitated.

SUB CODE: MM ENCL: 00

Card 1/1

L 40902-65 EWT(m)/EPF(c)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(b)/EWA(c) Pf-4 JD/
ACCESSION NR: AP5009281 HW/WB S/0369/65/001/001/0049/0053

AUTHOR: Pokhmurskiy, V.I.; Karpenko, G.V.

TITLE: Influence of high-temperature thermomechanical treatment on the cyclic strength of steel 45 in certain working media

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 1, 1965, 49-53

TOPIC TAGS: steel strength, steel corrosion, cyclic strength, thermomechanical treatment, steel hardening, fatigue strength/steel 45

ABSTRACT: The authors studied the influence of several variations of a promising new hardening method, the high-temperature thermomechanical treatment (HTMT) of steel 45, on its fatigue strength under conditions of simultaneous action of cyclic stresses and certain working media, and also the influence of preliminary corrosion on the fatigue strength of thermomechanically treated steel. The HTMT consisted of deforming specimens in the austenitic state by torsion, quenching immediately, and tempering. The effectiveness of HTMT in raising the fatigue limit of steel in a neutral medium (air) and corrosive medium (3% aqueous NaCl solution) is manifested in low-temperature tempering, i.e., in steel with a martensite or troostite-martensite structure. The presence of an optimum degree of deformation of the specific twist angle was established; it corresponds to the

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L 40902-65
ACCESSION NR: AP5009281

maximum increase in the fatigue and corrosion-fatigue strength of low-tempered steel. For corrosion-fatigue strength, the degree of deformation shifts toward higher values. The decrease in the fatigue limit of steel associated with an increase in the specific twist angle above the optimum value is explained by an intensification of the recrystallization of austenite deformed during the HTMT, and also by the appearance of products of non-martensitic transformation in the hardened steel. The hardening influence of the HTMT on the fatigue strength of the steel is also preserved after the preliminary corrosion of the specimens. Orig. art. has: 4 figures.

ASSOCIATION: FMI AN Ukr SSR, Lvov

SUBMITTED: 03Aug64 ENCL: 00 SUB CODE: MM

NO REF SOV: 004 OTHER: 000

Card 2/2

TKACHENKO, N.N.; VASILENKO, I.I.; KARPENKO, G.V.

Modeling the process of chemical dissolution of geometrically similar specimens. Fiz.-khim. mekh. mat. 1 no.2:144-146 '65.
(MIRA 18:6)

1. Fiziko-mekhanicheskiy institut AN UkrSSR, L'vov.

L 62535-65 EPF(c)/EWG(j)/EWP(z)/EWA(c)/EWT(m)/EWP(i)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t)
Pr-4/Pa-4 IJP(c) MJW/JD UR/0369/65/001/002/0167/0171
ACCESSION NR: AP5012650

AUTHOR: Karpenko, I. V.; Vasilenko, I. I.; Karpenko, G. V.

TITLE: Corrosion cracking of quenched steel when there are unetchable white layers on its surface

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 2, 1965, 167-171

TOPIC TAGS: steel, corrosion resistance, steel corrosion, corrosion cracking

ABSTRACT: Corrosion cracking of steel is a phenomenon caused by the static fatigue which takes place when a corrosion medium and static stresses act simultaneously on the metal. In many corrosion media, the cracking of steel is due in large measure to hydrogen absorption by the metal. Quenched and low-temper steels are usually subject to corrosion cracking. Very hard white layers which cannot be etched may be formed on the surface of parts made from quenched steels during grinding under certain conditions. This paper describes an investigation of cracking of quenched steel with a white layer on its surface in acid agents which cause hydrogen static fatigue (20% solution H_2SO_4) and in neutral agents (3% NaCl solution) in which anode processes prevail during corrosion. 40Kh steel, tempered to troostite-martensite

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ACCESSION NR: AP5012650

(HRC = 49-52) was studied. It was found that the white layer on the surface of quenched and low-temper steels increases the resistance of the steels to corrosion cracking. Residual tensile stresses have a negative effect on the resistance of quenched steel to corrosion cracking. Residual compression stresses are favorable in these cases. Cathode processes are mainly responsible for corrosion in an acid medium. White layers may be recommended as protection against corrosion cracking of quenched and low-temper steel in corrosive neutral media, e.g. sea water. The white layer does not last long in corrosive acid media; therefore it cannot be used in protection against corrosion cracking in these conditions. Orig. art. has: 4 figures, 3 tables.

ASSOCIATION: FMI AN UkrSSR, Lvov

SUBMITTED: 18Dec64 ENCL: 00 SUB CODE: MM

NO REF SOV: 004 OTHER: 000

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L 01123-66 EPA(s)-2/EWT(m)/EWP(w)/EPF(c)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)
IJP(c) JD/JW/JG/WB

ACCESSION NR: AP5019662 UR/0369/65/001/003/0355/0360

AUTHOR: Tkachenko, N. N.; Vasilenko, I. I.; Karpenko, G. V.

TITLE: Fracture of copper alloys during tests in mercury salt solutions

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 3, 1965, 355-360

TOPIC TAGS: copper alloy, brass fracture, bronze fracture, mercury nitrate solution, embrittlement, brittle fracture, anodic polarization, cathodic polarization

ABSTRACT: The fracture of brass under the action of mercury is usually attributed to its embrittlement owing to the penetration of atoms of mercury. The attendant decrease in strength and plasticity is due to a more or less pronounced decrease in the specific free energy of the new surfaces that develop in the process of plastic deformation, as a result of the adsorption of mercury ions thereon as well as of the formation of amalgams. During tests of brass in solution of mercury nitrate, the diffusion penetration of mercury into brass may be accompanied by the dissolution of anodic sectors, which usually contributes to crack formation. Considering, however, that cathodic polarization from an external current source was absent

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ACCESSION NR: AP5019662

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44, 18

prior to fracture (although in many cases of corrosion cracking cathodic protection prolongs the time until fracture), it had been concluded (R. B. Mears, R. H. Brown, E. H. Dix, Symposium on Stress Corrosion Cracking of Metals, ASTM-AIME, 1944, 67-110) that the fracture of brass in solutions of mercury salts (in the absence of polarization) is due to the penetration of mercury into the metal. In this connection, to clarify the role of anodic processes, the authors investigated the effect of anodic and cathodic polarization, in the presence of different current densities, on the length of the period until the fracture of brass in mercury nitrate solutions. Cylindrical specimens of brass and aluminum bronze (7% Al, 2% Fe, 91% Cu) with uniformly pure surfaces were, after machining and 2 hr annealing in a vacuum ($1 \cdot 10^{-4}$ mm Hg) at 300°C, subjected to fracture tests and tensile tests in special machines while being immersed in a bath of 0.15% mercury nitrate solution. The time until fracture was determined from the instant the solution was poured into the tank. Control experiments without polarization from an external current source also were performed (the platinum electrode was removed from the bath). It was found that both anodic and cathodic polarization accelerated the embrittlement and fracture of the specimen, anodic polarization being particularly effective. In the case of brass this effect of mercury was more marked than in the

L 01123-66

ACCESSION NR: AP5019662

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case of bronze. This is primarily attributed to the presence of zinc in bronze. Under conditions of the experiment, anodic polarization only partly prevented the deposition of mercury ions on the brass surface. At the same time it led to an intense dissolution of anodic sectors of the metal and thereby to the facilitation of crack formation in the surface layers, which were already embrittled by the penetrated mercury. A major role in accelerating the formation and development of cracks in the presence of anodic polarization is played by the selective nature of penetration of mercury into the metal -- through the adsorptional migration over grain boundaries and over the outcropping surface dislocations and other structural defects. As a result of such a mercury penetration, the metal becomes strongly embrittled and, in addition, the heterogeneity of its structure is enhanced, thus apparently leading to an intensification of electrochemical processes. Thus, anodic polarization leads to a sharp decrease in strength and plasticity but only in the cases where the surface layers are embrittled by the mercury diffusing into them. Orig. art. has: 6 figures.

ASSOCIATION: Fiziko-mekhanicheskiy institut AN UkrSSR, L'vov (Physico-Mechanical Institute, AN UkrSSR)

44,55

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L 01123-66

ACCESSION NR: AP5019662 O

SUBMITTED: 26Feb65 ENCL: 00 SUB CODE: MM, GC

NO REF SOV: 006 OTHER: 002

Card 4/4 DP

L 64763-65 EPF(c)/EWP(z)/EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t) MJW/JD/WB

ACCESSION NR: AP5019664 UR/0369/65/001/003/0373/0374

AUTHOR: Vasilenko, I. L.; Tkachenko, N. N.; Karpenko, G. V.

TITLE: Effect of electrolytic hydrogen absorption on the ductility of metals and alloys

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 3, 1965, 373-374

TOPIC TAGS: steel embrittlement, stainless steel embrittlement, copper embrittlement, zinc embrittlement, aluminum embrittlement, brass embrittlement, electrolytic hydrogen absorption, hydrogen embrittlement, St3, L59-1 brass, 1Kh18N9T steel

ABSTRACT: The effect of hydrogen absorbed during electrolytic treatment on the ductility of several ferrous and nonferrous metals and alloys has been studied. In copper, zinc, and aluminum subjected to tensile tests at a deformation rate of 0.2—0.4 mm/min immediately following electrolytic treatment (0.4—30 hr in a 20% H_2SO_4 at a current density of 4 a/dm^2), hydrogen absorption had no effect on the mechanical properties. Medium carbon (St3) and stainless 1Kh18N9T[AISI 321] steels, L659-1 brass, copper, and aluminum also were subjected to tensile tests during treatment in the same electrolyte. The ductility of the tested steels decreased appreciably with increasing current density, but the ductility of brass, copper,

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ACCESSION NR: AP5019664

and aluminum was unchanged regardless of the current density even at a deformation rate as low as 0.007 mm/min. Thus, it can be concluded that standard size specimens of copper, zinc, and aluminum are not susceptible to hydrogen embrittlement. Orig. art. has: 1 figure. [MS]

ASSOCIATION: Fiziko-mekhanicheskiy institut AN UkrSSR, Lvov (Physicomechanical Institute, AN UkrSSR)

SUBMITTED: 26Feb65 ENCL: 00 SUB CODE: MM,AS

NO REF SOV: 003 OTHER: 000 ATD PRESS: 4078

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(N) L 13021-66 EWT(d)/EWT(m)/EWP(w)/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)

ACC NR: AP5028367 SOURCE CODE: UR/0369/65/001/005/0531/0534

IJP(c) JD/WB/EM

AUTHOR: Nikolin, Ye. S.; Karpenko, G.V.

ORG: Physics-engineering Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: The effect of load frequency on the corrosion-fatigue strength of carbon steel

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 5, 1965, 531-534

TOPIC TAGS: carbon steel, corrosion, fatigue strength, corrosion resistant steel, MECHANICAL FATIGUE, DEFORMATION RATE

ABSTRACT: In order to clarify the effect of load frequency on the corrosion-fatigue processes under prolonged test conditions, the authors conducted tests of rotating steel specimens (7.52 mm in diam.) in air and in a medium simulating sea water (3% solution of NaCl), at frequencies of 25, 50, 80, and 160 cps. The tests lasted up to 600 hr on modified MUI-6000 and MVP-10000 machines. Standard specimens were treated by procedures producing minimal variations in the structure of the subsurface layer. It is found that at high amplitudes of load, i.e., at short-term periods in the medium, a high corrosion-fatigue strength of the steel is observed in cases of high frequency changes in the

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L 13021-66

ACC NR: AP5028367

load, which agrees with the widely held views on the effect of frequency. When the load amplitude is lowered to values appreciably increasing the time to failure, an inverse effect of the frequency on the corrosion-fatigue strength of steel is observed. In this case, at high frequencies the corrosion-fatigue strength is lower than that at lower frequencies. The investigation conducted verifies the assumption that the corrosion-fatigue process intensifies with rising frequencies, which is attributed to the considerable activation of the metal in the electrochemical corrosion process: the interaction of the metal with the medium increases with increasing frequency in stress variation, i.e., with an increase in the rate of deformation. Orig. art. has: 2 figures.

SUB CODE: 11 / SUBM DATE: 16May65 / ORIG REF: 002 / OTH REF: 002

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Card

(A) L 13020-66 EWT(m)/EWP(w)/EWA(d)/EWP(j)/T/EWP(t)/EWP(z)/EWP(b) MJW/JD/WW/WB/
ACC NR: AP5028368 RM SOURCE CODE: UR/0369/65/001/005/0535/0538

AUTHOR: Gutman, E.M.; Mindyuk, A.K.; Karpenko, G.V.

ORG: Physics-engineering Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Effectiveness of some corrosion inhibitors under load

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 5, 1965,535-538

TOPIC TAGS: corrosion inhibitor, corrosion rate, corrosion resistant steel, sulfuric acid, aqueous solution, stretch forming, mechanical fatigue

ABSTRACT: This work presents the results of an investigation into certain inhibitors of acid corrosion on the strength of steel subjected to uniaxial static stretching in aqueous solutions of sulfuric acid. The effect of thiourea, PB-8/2, KPI-2, N-phenyltrihydroxypyridinium chloride, and KPI-1 on the corrosion cracking of 30Kh steel in 6 n. H_2SO_4 subjected to a load of 120 dan/mm^2 showed that the greatest protective effect is produced by KPI-1; the time to failure was increased 340 times. The test of the effect of acid corrosion inhibitors on the static corrosion fatigue of 30Kh steel showed a high and relatively stable effectiveness of KPI-1 in protection from corrosion cracking at different levels of load (from 120 to 60 dan/mm^2) and a test base of 10^4 min. The increase in the effectiveness of KPI-1 at low loads is due,

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TKACHENKO, M.N.; VASILENKO, I.I.; KARPENKO, G.V.

Modeling the corrosive effect of a working medium on the strength of geometrically similar specimens. Fiz.-khim. mekh. mat. 1 no.5: 539-541 '65. (MIRA 19:1)

1. Fiziko-mekhanicheskiy institut AN UkrSSR, L'vov. Submitted April 14, 1965.

(N) L 12168-66 EWT(m)/EWP(w)/T/EWP(t)/EWP(b) MJW/JD

ACC NR: AP5028381 SOURCE CODE: UR/0369/65/001/005/0620/0621

AUTHOR: Tkachenko, N. N.; Boltarovich, A. V.; Karpenko, G. V. 38 B

ORG: Physics-engineering Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: The effect of the type of load on the corrosion-fatigue strength of steel

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 5, 1965, 620-621

TOPIC TAGS: corrosive strength, corrosion resistant steel, fatigue strength, cyclic strength, steel / Kh17N2 steel

ABSTRACT: The authors used Kh17N2 steel, which is widely utilized in the manufacture of parts intended for operation in corrosive media, to study the effect of type of load on the corrosion-fatigue strength of steel. The results show that the fatigue strength of specimens in air with a clean bend in the steel is higher than that under axial longitudinal load, and in tests in a corrosion medium this strength is considerably higher than with a clean bend. The conclusions obtained on the cyclic strength in air depending on the type of load do not contradict the existing opinions on the subject. In a corrosive medium the durability under cyclic longitudinal stress is higher than that under cyclic bending. Orig.

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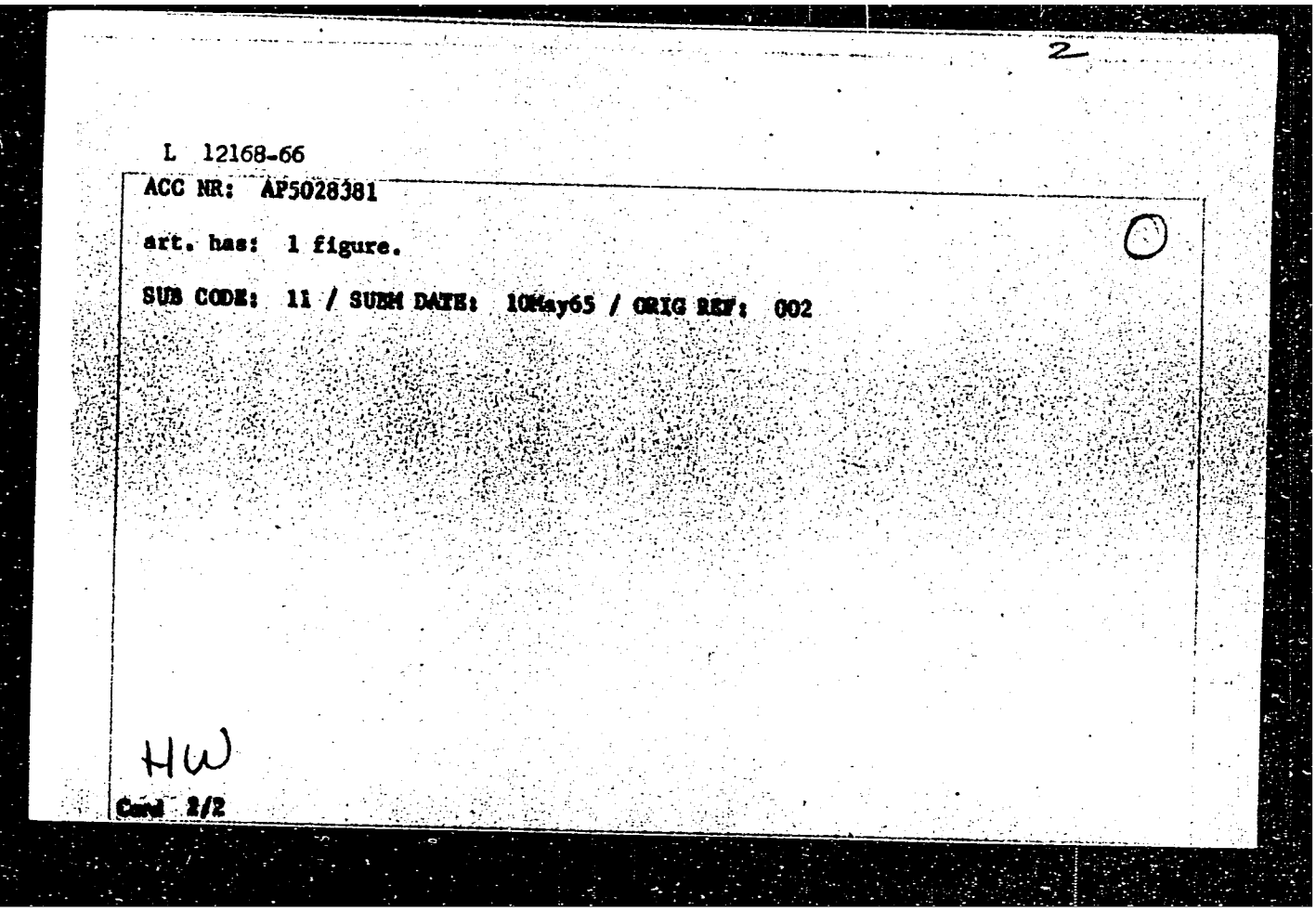

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L 12168-66

ACC NR: AP5028381

art. has: 1 figure.

SUB CODE: 11 / SUBM DATE: 10May65 / ORIG REF: 002

HW

Card 2/2

VASILENKO, I.I.; KARPENKO, G.V.; MIKITISHIN, S.I.; TKACHENKO, M.M.

Reversible and irreversible hydrogen brittleness. Fiz.-khim. mekh. mat. 1 no.5:624-625 '65. (MIRA 19:1)

1. Fiziko-mekhanicheskiy institut AN UkrSSR Lvov. Submitted June 16, 1965.

L 1Uh22-66 EWT(d)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)/EWP(z)/EWP(b)/EWP(l) MJW/JD/WB

ACC NR: AP6002118 SOURCE CODE: UR/0369/65/001/006/0694/0696

61
59
13

AUTHOR: Pokhmurskiy, V.I.; Boltarovich, A.V.; Tabinskiy, K.P.; Meyerson, I.L.; Karpenko, G.V.

ORG: Physicomechanical Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Effect of certain coatings on the fatigue strength and corrosion-fatigue strength of Kh17N2 steel

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 6, 1965, 694-696

TOPIC TAGS: fatigue strength, steel, nickel, cadmium, protective coating, organosilicon compound, metal property

ABSTRACT: The fatigue strength and corrosion-fatigue strength of hardened and tempered Kh17N2 steel were measured on NU machines after a nickel-cadmium and protective lacquer coatings (302 lacquer and V-58 material, a solution of an organosilicon polymer in toluene with mineral additives) were deposited on its surface. A 3% NaCl solution was used as the corrosion medium. In the latter, the coatings were found to affect considerably the strength of cyclically deformed steel, particularly at high stress amplitudes and

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L 14422-66

ACC NR: AP6002118

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a small number of cycles. At about 2×10^7 cycles, the best protective effect was shown by the coating of 302 lacquer, but the fatigue strength decreased sharply, owing to a breakdown in the continuity of the coating. The situation was similar in the case of the nickel-cadmium electrodeposit, except that the fatigue limit was lower than with the 302 lacquer. At about 2×10^7 cycles, an extensive attack of the Ni-Cd coating and sharp drop of the limit of corrosion-fatigue strength took place. Deposition of V-58 had practically no effect on the corrosion-fatigue resistance of the steel, owing to the porosity and loose adhesion of this coating. Orig. art. has: 1 figure.

SUB CODE: 11 / SUBM DATE: 20Jun65 / ORIG REF: 003

FW

Card 2/2

L 11421-66

ACC NR: AP6002119 SOURCE CODE: UR/0369/65/001/006/0697/0700

AUTHOR: Vasilenko, I.I.; Tkachenko, N.N.; Karpenko, G.V.

ORG: Physicomechanical Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Effect of electrodeposits on cracking of hardened steel during testing in air and in hydrogenating corrosive media

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 6, 1965, 697-700

TOPIC TAGS: copper, nickel, cadmium, zinc, chromium, protective coating, steel, hydrogen embrittlement, sulfuric acid, corrosion protection, cathode polarization, tensile strength

ABSTRACT: The effect of cadmium, zinc, nickel, chromium, copper, and brass plating and of aging conditions after deposition on the short-term and long-term static strength of oil-hardened 45 steel was studied by testing in air and in 20% H_2SO_4. The coatings were found to decrease σ_b considerably. Aging for 2 hr. at 210 — 220C completely restored the strength of Cr- and Ni-plated samples, but not in the case of the other deposits. The effect of aging temperature on the recovery of the strength of Cd, Zn, and

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L 14421-66

ACC NR: AP6002119

Cu-plated samples was studied. The decrease in long-term strength observed in the latter case was due to an incomplete desorption of the hydrogen dissolved in the metal. In 20% H_2SO_4, of all the metals, only the copper deposit provided a complete protection against corrosive attack of the steel. It is postulated that these protective properties are due to the low diffusional permeability of the coating to hydrogen. The copper deposit prevents hydrogen desorption during aging and protects the steel against hydrogen absorption during testing in the electrolyte both with and without cathodic polarization. Copper plating is therefore recommended for practical applications of this type. Orig. art. has: 3 figures and 1 table.

SUB CODE: 11, 07 / SUBM DATE: 27Jun65 / ORIG REF: 004 / OTH REF: 004

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